**Remarks**

By this Amendment, Applicants have amended claims 21, 25, 31, 34, 37, and 40 and have canceled claim 36. After entry of this Amendment, independent claims 21, 31, 34, and 37 and dependent claims 22, 24-26, 29, 30, 32, 33, 35, 38, and 39 are pending. The rejections in the final Office Action mailed October 28, 2005 are addressed below in the order presented in the Office Action and in light of the interview conducted on or about March 7, 2006, the substance of which is described further below.

**Rejections Under 35 U.S.C. § 112**

The Examiner has rejected claims 21, 22, 24-26, and 29-40 under 35 U.S.C. § 112, second paragraph, as failing to point out and distinctly claim the subject matter that Applicants regard as the invention. Specifically, the Examiner has rejected independent claims 21 and 37 based upon the limitation of "a length at least as long as the irradiated nuclear fuel assembly" and stating that "there is not a unique length of an irradiated fuel assembly because there is a plurality of types of fuel assemblies". Further, the Examiner contends that this recitation makes the irradiated nuclear fuel assembly a positively recited element of the claim and inconsistent with the preamble of the claim, which recites the irradiated nuclear fuel assembly as part of an intended use clause.

The Examiner rejected independent claims 31 and 37 based upon the limitation that the node structure is "an approximate multiple of said spacing between each of said fuel rods" and stating that "there is not one unique spacing of fuel rods for all types of fuel assemblies". In addition, the Examiner rejected independent claim 34 based upon the claim limitation that at least one plurality of ultrasonic transducers are "adjacent to a first one of said four sides of said irradiated nuclear fuel assembly" and stating that not all irradiated fuel assemblies have so-called "sides". Based upon the interview with the Examiner, Applicants understand that part of the basis for these rejections is the Examiner's contention that the fuel rods and the sides of the irradiated nuclear fuel assembly are positively recited elements, similar to the rejections above for independent claims 21 and 37.

In light of the amendments to independent claims 21, 31, 34, and 37, Applicants submit that these rejections have been overcome. Independent claims 21 and 37 now each recite that the opening at a first end of the housing and the length of the housing are configured to receive and are configured to be at least as long as an irradiated nuclear fuel

assembly to be received by the housing. Therefore, the irradiated nuclear fuel assembly is not a positively recited element of the claim and instead is part of an intended use clause consistent with the preamble of each of these claims.

In addition, independent claims 31 and 37 have been amended to recite that the omnidirectional ultrasonic energy waves have a node structure that is an approximate multiple of a spacing between the fuel rods of an irradiated nuclear fuel assembly to be received by the housing. Accordingly, Applicants submit that the fuel rods of the irradiated nuclear fuel assembly and the spacing between them are not a positively recited element of the claim and instead are part of an intended use clause consistent with the preamble of each of these claims.

Lastly, claim 34 now recites that each one of said at least four pluralities of ultrasonic transducers is positioned on said elongated housing such that each one of said at least four pluralities of ultrasonic transducers is adjacent to a different one of four sides of an irradiated nuclear fuel assembly to be received by said elongated housing. Applicants submit that the irradiated nuclear fuel assembly and its sides are not positively recited elements of the claim and instead are part of an intended use clause consistent with the preamble of each of these claims.

Based on these amendments, Applicants submit that these claims clear and definite. Accordingly, Applicants request withdrawal of these rejections as to independent claims 21, 31, 34, and 37 and corresponding dependent claims 22, 24-26, 29, 30, 32, 33, 35, and 38-40 (noting that claim 36 has been canceled).

**Rejections Under 35 U.S.C. § 102**

The Examiner has rejected claims 21, 22, 24, 29, 31, 32, and 37-39 under 35 U.S.C. § 102(b) as being anticipated by EP 0418722 A1 ("Fiorenzo"). Applicants respectfully traverse these rejections.

Applicants have previously described the teachings of Fiorenzo to illustrate that Fiorenzo teaches the use of planar transducers and does not teach or suggest the use of ultrasonic transducers that each emanate omnidirectional energy waves. The reason that Fiorenzo only uses planar transducers is based on two aspects of the process and equipment taught by Fiorenzo. First, Fiorenzo is a process for total decontamination or decommissioning of heat exchanger tubes that have been exposed to radioactive material.

Therefore, Fiorenzo needs to apply the maximum amount of ultrasonic energy to the heat exchanger tubes and, naturally, would do so in the most efficient manner possible.

(It should also be appreciated that Fiorenzo's process is directed to the cleaning of heat exchanger tubes and is not directed to the cleaning of a nuclear fuel assembly. However, even assuming, *arguendo*, that Fiorenzo applies to the cleaning of nuclear fuel assemblies, Fiorenzo's process fails to provide any teaching regarding the necessity of maintaining the integrity of the fuel pellets if they are to be re-used. In the present application, one benefit of the invention is that the fuel can be re-used after cleaning and is not destroyed or damaged by the cleaning. Since Fiorenzo fails to provide any teaching about maintaining the integrity of fuel pellets, the lack of such teaching supports the conclusion that Fiorenzo is interested in applying the maximum amount of ultrasonic energy to the heat exchanger tubes in the most efficient manner possible.)

Second, Fiorenzo teaches the placement of transducers on the outside walls of an outer tank that holds within it a second inner tank that in turn holds the heat exchanger tubes to be cleaned. The inner tank contains wash water and the outer tank contains a liquid solution used to maintain the temperature of the wash water in the inner tank. The transducers on the outer side walls and the bottom of the outer tank must convey ultrasonic energy in one direction only—toward the inner tank where the heat exchanger tubes are located.

To provide the maximum and most efficient application of ultrasonic energy from the outside wall of the outer tank to the inner tank requires the use of transducers that emanate their energy in a single direction and not in multiple directions. The use of omnidirectional transducers in the apparatus taught by Fiorenzo would be extremely inefficient, thereby reducing the maximum cleaning that Fiorenzo desires and failing to direct their ultrasonic energy toward the heat exchanger tubes to be cleaned.

In the interview with the Examiner, the Examiner noted that the transducers of Fiorenzo may ultimately produce omnidirectional energy waves in the tank and that the claims of the present application did not clearly illustrate that the transducers themselves were producing or emanating the omnidirectional energy waves themselves. Independent claims 21, 31, 34, and 37 have each been amended to recite that each ultrasonic transducer comprises a rod that is configured to emanate omnidirectional energy waves. These claims

now clearly recite that the transducers themselves emanate the omnidirectional energy waves and, accordingly, are distinguishable from planar transducers as used in Fiorenzo.

Based on the foregoing, Applicants submit that Fiorenzo does not teach or suggest the use of transducers that comprise a rod that is configured to emanate omnidirectional energy waves. Therefore, Applicants request the withdrawal of this rejection as to independent claims 21, 31, 34, and 37 and corresponding dependent claims 22, 24, 29, 32, 38, and 39.

**Rejections Under 35 U.S.C. § 103**

Rejection of Claims 25 and 26

The Examiner has rejected claims 25 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of U.S. Patent No. 5, 200,666 ("Walter"). As described above, Fiorenzo fails to teach or suggest transducers that emanate omnidirectional energy waves as recited in independent claim 21 from which claims 25 and 26 depend. Based on the teachings of Fiorenzo (*e.g.*, maximum energy directed at the heat exchanger tubes to provide total decontamination and the placement of the transducers on the outside wall of the outer tank such that the energy must be directed in only one direction, which is toward the center of the tank), Applicants submit that one of skill in the art would not be motivated to substitute the planar transducers of Fiorenzo with those taught by Walter or have an expectation of success in such substitution.

As discussed above, Fiorenzo needs transducers that transmit energy in a single direction—toward the inner tank. The use of the transducers taught by Walter would result in inefficient use of the transducer energy since not all of the transducer energy would be directed toward the inner tank. Therefore, one of skill in the art would not be motivated to combine these references or have an expectation of success in their combination. Therefore, Applicants request withdrawal of this rejection.

Rejection of Claims 30, 33, and 40

The Examiner has rejected claims 30, 33, and 40 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of the combination of U.S. Patent No. 5,467,791 ("Kato") and U.S. Patent No. 5,377,237 ("Richardson"). Applicants respectfully traverse this rejection.

As described above, Fiorenzo fails to teach or suggest transducers that emanate omnidirectional energy waves as recited in independent claims 21, 31, and 37 from which

claims 30, 33, and 40 depend, respectively. Neither Kato nor Richardson supply this missing teaching. Therefore, Applicants request withdrawal of this rejection.

Rejection of Claims 34-36

The Examiner has rejected claims 34-36 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of the combination of U.S. Patent No. 4,320,528 ("Scharton"), Kato, and Richardson. Noting that claim 36 has been canceled, Applicants respectfully traverse this rejection as to claims 34 and 35.

Again, as described above, Fiorenzo does not teach or suggest transducers that emanate omnidirectional energy waves as recited in independent claim 34 and from which claim 35 depends. Neither Scharton, Kato, nor Richardson supply this missing teaching. On this basis alone, Applicants request withdrawal of this rejection.

In addition, the Examiner states that it would be obvious to move the transducers in Fiorenzo from the outside wall of the outer tank to inside the inner tank based upon the teaching of Scharton. To the contrary, Scharton teaches the placement of the transducers on either the inside or outside of a single tank containing the heat exchangers to be cleaned. The teaching of Scharton, at best, would only result in placing the transducers of Fiorenzo on the inside wall of the outer tank and not adjacent to any given wall of a nuclear fuel assembly. There is no teaching or suggest provided to motivate one of skill in the art to move the transducers of Fiorenzo to the inside wall of the inner tank. Moreover, Scharton does not address the cleaning of nuclear fuel assemblies and, therefore, one of skill in the art would not combine its teachings with those of Fiorenzo.

Further, the Examiner states that to produce the homogenous power density recited in Fiorenzo it would be inherent to have transducers evenly spaced from each other around the periphery of the tank. However, there is no technical support given for the contention that a homogeneous power density will result in the apparatus of Fiorenzo if the transducers are evenly spaced. Therefore, Applicants request withdrawal of this rejection.

**Substance of the Interview**

Applicant's representative thanks the Examiner for the interview conducted on or about March 7, 2006. The current rejections in the final Office Action mailed on October 28, 2005 were discussed. In particular, the 35 U.S.C. § 112 rejections relative to claim 21 were discussed, including the particular claim language relied upon for the rejection and the issues

with that language. For example, the Examiner described the basis for the contention that the fuel assembly appears to be recited as an element of the claim.

The rejections based upon Fiorenzo were also discussed relative to the omnidirectional waves recited in claim 1. Specifically, the issue of whether the waves originate at the transducer itself or are generally present in the system at a location separate from the transducer, for example, as a result of planar waves from a transducer reflecting within the system and thereby creating waves traveling in various directions within the system.

Applicant's representative described the intent of the process of Fiorenzo and why Fiorenzo is only using planar transducers. Applicants noted that Fiorenzo is directed to cleaning materials that will be permanently stored and not reused. Accordingly, Fiorenzo desires to obtain the maximum cleaning possible and is not concerned with damaging the materials in the cleaning process since they will not be reused. Fiorenzo accomplishes the maximum cleaning possible by directing the maximum amount of ultrasonic energy produced by the transducers toward the materials being cleaned, which reside in an inner tank surrounded by an outer tank. Since the transducers are located on the outside of the outer tank, only planar transducers, which produce energy waves that emanate in one direction, can be used to direct all of the ultrasonic energy toward the inner tank. Using transducers that themselves produce waves emanating in all directions would be inefficient since only a portion of the ultrasonic energy from such transducers located on the outside of the outer tank would reach the inner tank. The Examiner indicated that such an argument would be more persuasive if the claim language clearly recited that the transducers themselves generate omnidirectional energy waves.

Applicant noted that they would amend the claims accordingly and file a Request for Continued Examination in light of this interview.

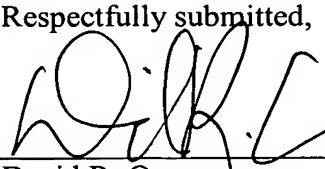
**Conclusion**

In view of the above considerations, Applicants believe that all of the claims are in condition for allowance and respectfully request the same. The Examiner is invited to call the undersigned attorney if a telephone call could help resolve any remaining items.

Applicants believe that no other fees are due other than those authorized in the concurrent submissions herewith, including the Request for Continued Examination and the

Request for Extension of Time. To the extent that any additional fee is required, Applicants hereby authorize such fee to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 060825-0306 US). For example, if any extension of time is required to file the Request for Continued Examination and this Amendment, Applicants hereby petition for the required extension of time and authorize any required fee for such extension to be charged to the above deposit account. A copy of this sheet is enclosed for such purpose.

Respectfully submitted,

Date: April 28, 2006 By:  40,756

David R. Owens Reg. No.

**Morgan, Lewis & Bockius LLP**
2 Palo Alto Square
3000 El Camino Real, Suite 700
Palo Alto, California 94306
(650) 843-4000